responsible, but finally it is implied, although not specifically stated, that the poisoner was the Comte de Montholon (whose wife, incidentally, was Napoleon's mistress in St. Helena). The Count, in true thriller fashion, persuades Napoleon to change his will in his favour and when this is done recommences his final administration of poison !

It is implied, but not definitely stated, that he administered poison at the instigation of Talleyrand. and the author even claims that the administration must have been begun at Elba, and that certain of the indispositions Napoleon exhibited at the Battle of Waterloo "fit in very well with the general picture of arsenical poisoning" ! It is also claimed that even earlier in his reign Napoleon was being drugged, at the instigation of the Great Powers fighting against him.

Napoleon is obviously the author's hero, but even this should not allow him to make errors in the assessment of history; he states that after his escape from Elba the whole of France welcomed him with joy. The truth is that the great mass of the French people were heartily sick of his antics, which had brought so many years of war and sorrow, and had resulted in almost every family grieving a father or sons. The only real support Napoleon met with on his last adventure was from the scores of thousands of his veterans who had been demobilized after peace was signed and, having known nothing but war because of his campaigns, were largely unsuited to return to civilian life and were, at that moment, glad of a chance to return to the life they knew. They were soon disillusioned. The rest of the nation had already been disillusioned.   RUSSELL BROCK

LINEAR SPACES

Linear Algebra and Geometry
By Prof. Nicolaas H. Kuiper. Translated from the Dutch by A. van der Sluis. Pp. viii + 284. (Amsterdam : North-Holland Publishing Company, 1962.) 48s.

An Introduction to the Theory of Linear Spaces
By Prof. Georgi E. Shilov. Translated from the Russian by Richard A. Silverman. Pp. ix + 310. (London : Prentice-Hall International, 1961.)   50s.

Proceedings of the International Symposium on Linear Spaces
Held at the Hebrew University of Jerusalem. July 5–12, 1960. (A publication of the Israel Academy of Sciences and Humanities.) Pp. xi + 452. (Jerusalem : Jerusalem Academic Press; London and New York : Pergamon Press, 1961.)   100s.; 14 dollars.

LINEAR algebra is occupying an increasingly prominent place in the undergraduate mathematics curriculum. In the first place it is the basic mathematical tool in the study of the analytic geometry of n dimensions and in affine and projective geometry. Secondly, the notions of vector space and linear transformation are central to the study of systems of linear equations (and linear differential equations). Thirdly, these notions form a necessary and fairly elementary introduction to those concepts proper to group theory, to topology and to functional analysis, with which the student will have to familiarize himself later in his course. Fourthly, there is a growing realization of the importance and variety of

the applications of linear algebra outside the domain of pure mathematics, for example, in statistics, linear programming, operational research. Fifthly, functional analysis and topological algebra constitute a very active area of present-day mathematical research and it is essential for any student aspiring to work in this field to familiarize himself thoroughly with the theory of finite-dimensional spaces. (Actually, the algebraic topologist also needs much of this basic theory; I myself, as an interested party, regretted the absence of a treatment of tensor products and exterior powers from the two text-books under review.)

The book by Kuiper is an excellent undergraduate text-book in which (as one would expect of the author) the geometric motivation is strongly, but not obtrusively, emphasized. Thus while the abstract concepts of vector space and mapping are given due prominence and the treatment is very largely co-ordinate-free, there are chapters devoted to Euclidean motions, to projective geometry and to non-Euclidean planes. Two further features of the book deserve mention. First, there is an interesting chapter on the applications in statistics, and, secondly, each chapter (except for the first two, which are brief) carries a number of stimulating and appropriate exercises. By way of mild criticism, however, it must be admitted that the book has clearly not been translated into English by an Englishman !

The book by Shilov is much less overtly motivated by geometric considerations. Whereas Kuiper is a geometer, Shilov is a functional analyst, and it is a measure of the ubiquitousness of linear algebra in mathematics that the actual contents of the two works overlap so substantially. In fact, it is Shilov's avowed object to introduce the reader to functional analysis. Not only is this intention made evident to some extent by the choice of material and style of presentation of the earlier chapters, but also the book closes with a long, and exceedingly valuable, chapter on infinite-dimensional Euclidean spaces, which constitutes one of the most accessible introductions to the basic concepts of functional analysis. The notions of completion, of orthogonal expansions, of bounded and completely continuous operators are discussed and there is a treatment of the eigenvector problem for a Fredholm operator and of the immediately relevant parts of the theory of integral equations. The book is well provided with examples, exercises and bibliography and its appearance bodes well for the series of translations of Russian texts of which it is the first. It was not to my taste that the book opened with a substantial chapter discussing determinants with Victorian formality (in the book by Kuiper, determinants appear on p. 91 as functions of endomorphisms of finite-dimensional vector spaces); and throughout the early chapters the treatment is perhaps excessively 'co-ordinatized'. But tastes vary, and the later chapters should suit most palates.

The third work under review contains the 32 papers read at the International Symposium on Linear Spaces held in Jerusalem during July 1960. The topics discussed range widely over the field of functional analysis and bear eloquent testimony to the vitality of this mathematical topic to-day. The Israel Academy of Sciences and Humanities is to be congratulated on the speedy publication of this record of an important conference.

                                        P. J. HILTON